

REMARKS/ARGUMENTS

This amendment is responsive to the Office Action mailed 6/16/2008 (hereinafter, "6-16-08 OA") wherein: Claims 1-3, 5, 12, 13, 23-26, and 31 were rejected under USC §103(a) as being unpatentable over Tuy et al. (US 5,297,043) and Nishihara et al. (US 4,903,317); Claims 4 and 7 were rejected under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Scorse, et al. (US 5,128,776); Claims 6 and 8 were rejected under 35 USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Ransford, et al. (EP 479,563 A2); Claims 15 and 16 were rejected under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Sutherland, et al. (US PUB 2005/0277823 A1); Claims 17 and 18 were rejected under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Chui, et al. (US 5,541,473); Claim 19 was rejected under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 and Chui, et al. '473 in view of Reinsch (US 5,134,661); and Claim 20 was rejected under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 and Zanelli (US 6,515,657).

Claims 1-5, 7-8, 12-13, 15, 17-26, and 31 were amended. No claims were canceled or added.

Claims 1-8, 12-26, 31-33, and 35-38 remain pending in this Application. Reconsideration in light of the following remarks is respectfully requested.

In the 6-16-08 OA, at section 22, the Examiner rejected Claims 1-3, 5, 12-13, 23-26, and 31 as being unpatentable over Tuy et al. '043 and Nishihara et al. '317. With respect to Claims 1, 12, 24, and 31, the Examiner stated, in section 23, that Tuy et al. '043 discloses "providing a span of interest for an acquired image sequence...selecting a portion of the acquired image sequence in the span of interest [and] displaying the analytically relevant image sequence" where Tuy et al. '043 does not expressly disclose that the selected portion is losslessly compressed and decompressed, and where Nishihara et al. '317 discloses losslessly compressing and decompressing a region of interest (ROI) of image data. The Examiner further stated that, "[a]t the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Tuy with the teaching of Nishihara by applying lossless compression to the selected portion. The motivation would have been to reduce the storage requirement while preserving the fidelity of the important portion, such as the diseased portion of medical images, as Nishihara indicates in Col. 8, lines 35-43."

The Applicants claim in claim 1, as amended, a method of image compression and decompression comprising: providing a span of interest for an acquired image sequence wherein the span of interest defines a time sequence and a space sequence in the acquired image

sequence that includes analytically relevant information in the acquired image sequence; selecting at least one frame in the acquired image sequence in the span of interest; applying lossless compression to the at least one frame and obtaining therefrom at least one compressed image; applying decompression to the at least one compressed image and obtaining therefrom at least one analytically relevant image; and displaying the at least one analytically relevant image, thereby displaying the analytically relevant information. As disclosed in the Application at paragraph [0017], a portion of image is defined as at least one frame or a plurality of frames, where a frame is a single image for the imaging technique being used. Applying lossless compression to the frame, or input image, produces an input image which remains intact. The claimed image compression and decompression method provides the advantages of achieving higher compression ratios with lower complexity (paragraph [0018]).

In contrast, Tuy et al. '043 teaches the acquisition and storage of image data as "p planes of $m \times n$ data" (col. 4, lines 66-68), where an operator "select[s] the boundaries of a volumetric subregion to be displayed" (col. 5, lines 23-24). This can best be seen with reference to Fig. 2 of Tuy et al. '043 which shown p planes of $m \times n$ data, and to Fig. 3C which shows a volumetric subregion comprising portions of the p planes. An operator uses a control panel to define the volume of interest (i.e., the volumetric subregion) and to cause the defined volume to be displayed on a video screen (col. 5, lines 36-39). That is, unlike the claimed method of selecting one or more entire frames as disclosed by the Applicants, Tuy et al. '043 teaches the selection only of the portions of frames contained within a defined volumetric subregion.

Moreover, Nishihara et al. '317 defines a region of interest (ROI) in a medical image as "not distributed in the entire image, but is locally present in the image" (col. 8, lines 37-40). This can be more clearly understood with reference to Figures 11 and 12 of Nishihara et al. '317, where only a portion (denoted by 'a') of an image (denoted by 'b') is a region of interest (ROI). As taught by Nishihara et al. '317, "[a]n image region other than the [ROI] is observed only to determine the position of the [ROI] in the entire image, and hence, need not have a high image quality. From this point of view, it is effective that only the ROI is lossless-compressed and other non-ROI is loss compressed" (col. 8, lines 40-45). Only the "ROI is lossless-compressed and a region other than the ROI is loss-compressed [such that] a compression ratio of [the] entire image can be increased" (col. 9, lines 55-58). As can be appreciated by one skilled in the relevant art, the imaging system taught by Nishihara et al. '317 performs the functions of: (i) designating only a portion of an image or series of images for lossless compression; (ii) compressing the remaining image(s) using lossy compression; and (iii) decompressing and reconstructing the original image(s). Such a system thus has the shortcomings of being more complex and requiring more computational resources than the imaging system and method claimed by the Applicants.

The Examiner contends, at section 23 of the 6-16-08 OA, that it would have been obvious

to one of ordinary skill in the art to modify Tuy with the teaching of Nishihara by applying lossless compression to the selected portion, so as to obtain the invention as specified in claim 1. The Applicants respectfully submit that since claim 1, as amended, claims a method of image compression and decompression in which an entire frame is lossless compressed and subsequently decompressed, claim 1 is not unpatentable over Tuy et al. '043 and Nishihara et al. '317 which, in combination, teach the lossless compression and decompression of only a portion of an image frame. The Applicants further submit that this argument also applies to independent claims 12, 23, 24, and 31 as amended.

Accordingly, the Applicants respectfully request that the rejection of Claims 1, 12, 23-24, and 31, and dependent Claims 2-3, 5, 13, and 25-26 under 35 USC §103(a) be withdrawn.

In the 6-16-08 OA, at section 29, the Examiner also rejected Claims 4 and 7 under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Scorse, et al. '776. The Examiner stated that Scorse, et al. '776 discloses the limitation of "archiving the analytically relevant image sequence." The Applicants respectfully submit that, for the reasons given above for allowance of Claim 1, this additional limitation does not render unpatentable Claims 4 and 7 which depend from Claim 1.

In the 6-16-08 OA, at sections 31 and 32, the Examiner also rejected Claims 6 and 8 under 35 USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Ransford, et al. 479,563. The Examiner stated that Ransford discloses the limitation of "the user select option compris[ing] segmenting an identifiable anatomy of a patient." The Applicants respectfully submit that, for the reasons given above for allowance of Claim 1, this additional limitation does not render unpatentable Claims 6 and 8 which depend from Claim 1.

In the 6-16-08 OA, at sections 34-36, the Examiner also rejected Claims 15 and 16 under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Sutherland, et al. (US PUB 2005/0277823 A1). The Examiner stated that Sutherland discloses the limitation of "capturing x-ray angiograms and comparing a series of angiograms over a time period." The Applicants claim, in claim 15 as amended, a method of image compression and decompression for images obtained by an x ray angiogram device, comprising: providing a span of interest for the images obtained by the x ray angiogram device, wherein the span of interest defines a plurality of frames in a time sequence between two time instances that includes analytically relevant information in the images; applying lossless compression to the plurality of frames and obtaining therefrom a compressed image sequence; applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence; and displaying the analytically relevant image sequence. The Applicants submit that, by applying to Claim 15 the same arguments given above for allowance of Claim 1, this additional limitation

does not render unpatentable independent Claim 15 and dependent Claim 16.

In the 6-16-08 OA, at sections 37-38, the Examiner also rejected Claims 17 and 18 under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 in view of Chui, et al. (US 5,541,473). The Examiner stated that Chui, et al. '473 discloses the limitation of "compressing MRI image sequences." The Applicants claim, in claim 17 as amended, a method of image compression and decompression for images obtained by an MRI device, comprising: providing a span of interest for the images obtained by the MRI device, wherein the span of interest defines a plurality of frames in a time sequence between two time instances that includes analytically relevant information in the images; applying lossless compression to the plurality of frames and obtaining therefrom a compressed image sequence; applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence; and displaying the analytically relevant image sequence. The Applicants respectfully submit that, by applying to Claim 17 the same arguments given above for allowance of Claim 1, this additional limitation does not render unpatentable either independent Claim 17 or dependent Claim 18.

In the 6-16-08 OA, at section 40, the Examiner further rejected Claim 19 under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 and Chui, et al. '473 in view of Reinsch '661. The Examiner based the rejection on the teaching by Reinsch '661 to use edge detection to select areas of interest. The Applicants respectfully submit that, for the same arguments given above for allowance of Claim 17, this additional limitation does not render unpatentable Claim 19 which depends from Claim 17.

Additionally, in the 6-16-08 OA at sections 41-42, the Examiner rejected Claim 20 under USC §103(a) as being unpatentable over Tuy et al. '043 and Nishihara et al. '317 and Zanelli '657. The Examiner based the rejection on the disclosure by Zanelli '657 of using an ultrasound device to acquire image data. The Applicants claim, in claim 20 as amended, a method of image compression and decompression for images obtained by an ultrasound device, comprising: providing a span of interest for the images obtained by the ultrasound device, wherein the span of interest defines at least one frame in a time sequence and a space sequence; applying lossless compression to the least one frame and obtaining therefrom a compressed image sequence; applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence; and displaying the analytically relevant image sequence. The Applicants respectfully submit that, for the same arguments given above for allowance of Claim 1, this additional limitation does not render independent Claim 20 unpatentable.


In view of the foregoing Amendment and for the reasons set out above, the Applicants respectfully submit that independent Claims 1, 12, 15, 17, 20, 23, 24, and 31 are now in condition

for allowance. The Applicant further submits that the remaining Claims, each of which depends, directly or indirectly, from one of the independent Claims are now also in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further is needed to place the Application in condition for allowance, the Examiner is requested to contact Applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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